Status of White-nose Syndrome in 2010

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US Fish & Wildlife Service

Wetlands Forum – Buffalo, NY

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White-nose Syndrome (WNS)

- Unprecedented impacts on North American bats
- Investigation under way
  - A collaborative effort
    - Research
    - Management
    - Outreach

What is WNS?

Clinical signs:

- A white fungus evident around the nose, wing, or tail membrane of most affected animals.

- Scaly residue on arms (primarily observed late spring, after emergence).

Behavioral signs

- Bats flying outside of hibernacula during daylight hours
- Shift roosting locations inside the cave/mine
- Often found dead near the entrances or nearby structures.
- Depleted body fat (“starving”)

Bat carcasses on the floor of a hibernaculum

(Mt. Aeolus, Vermont - 2009)

Jonathan Reichard

Alan Hicks

Bat Species Affected by WNS

Little brown bat
Myotis lucifugus

Indiana bat
Myotis sodalis

Virginia big-eared bat
Corynorhinus t. virginianus

Big brown bat
Eptesicus fuscus

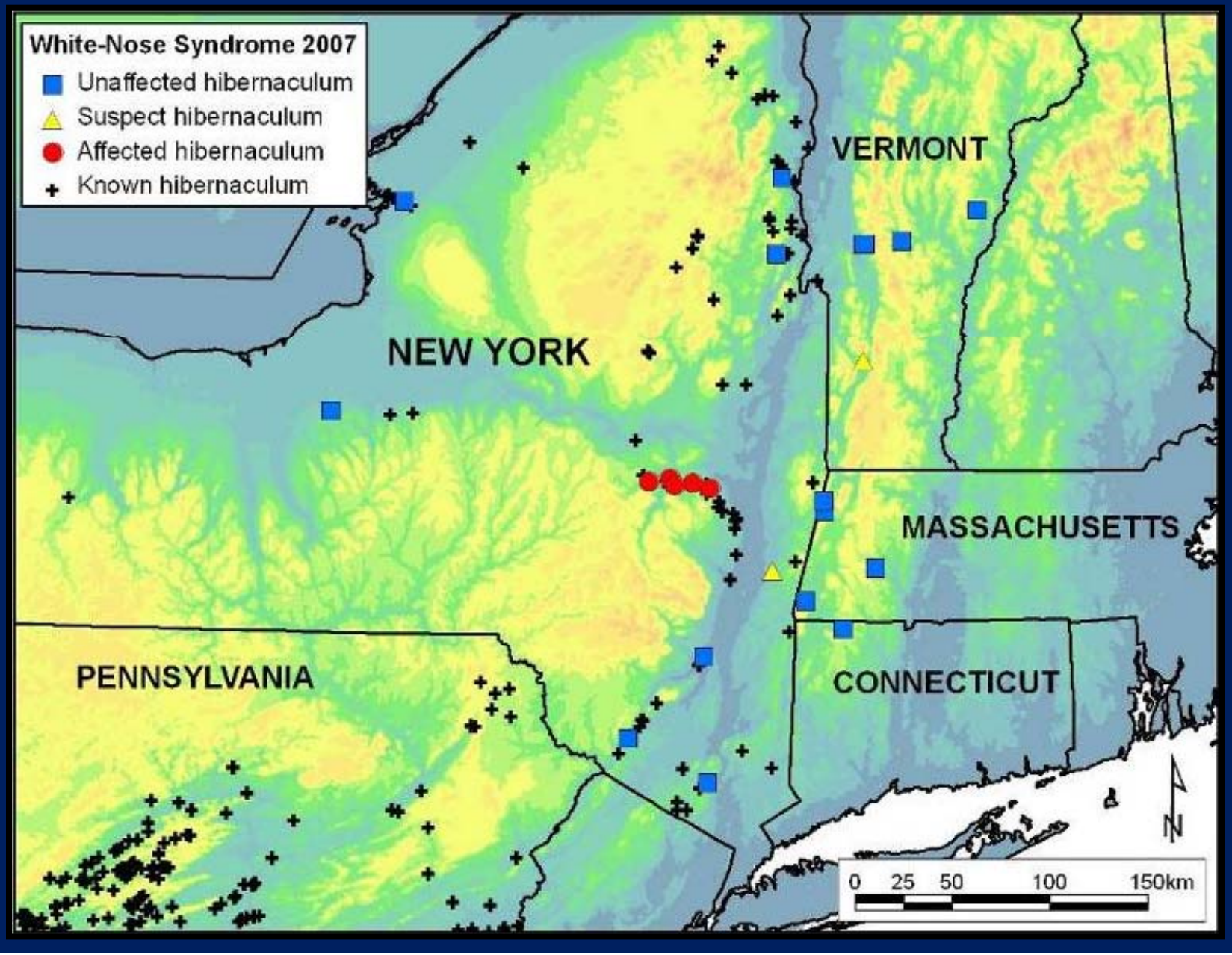
Tri-colored bat
Perimyotis subflavus

Gray bat
Myotis grisescens

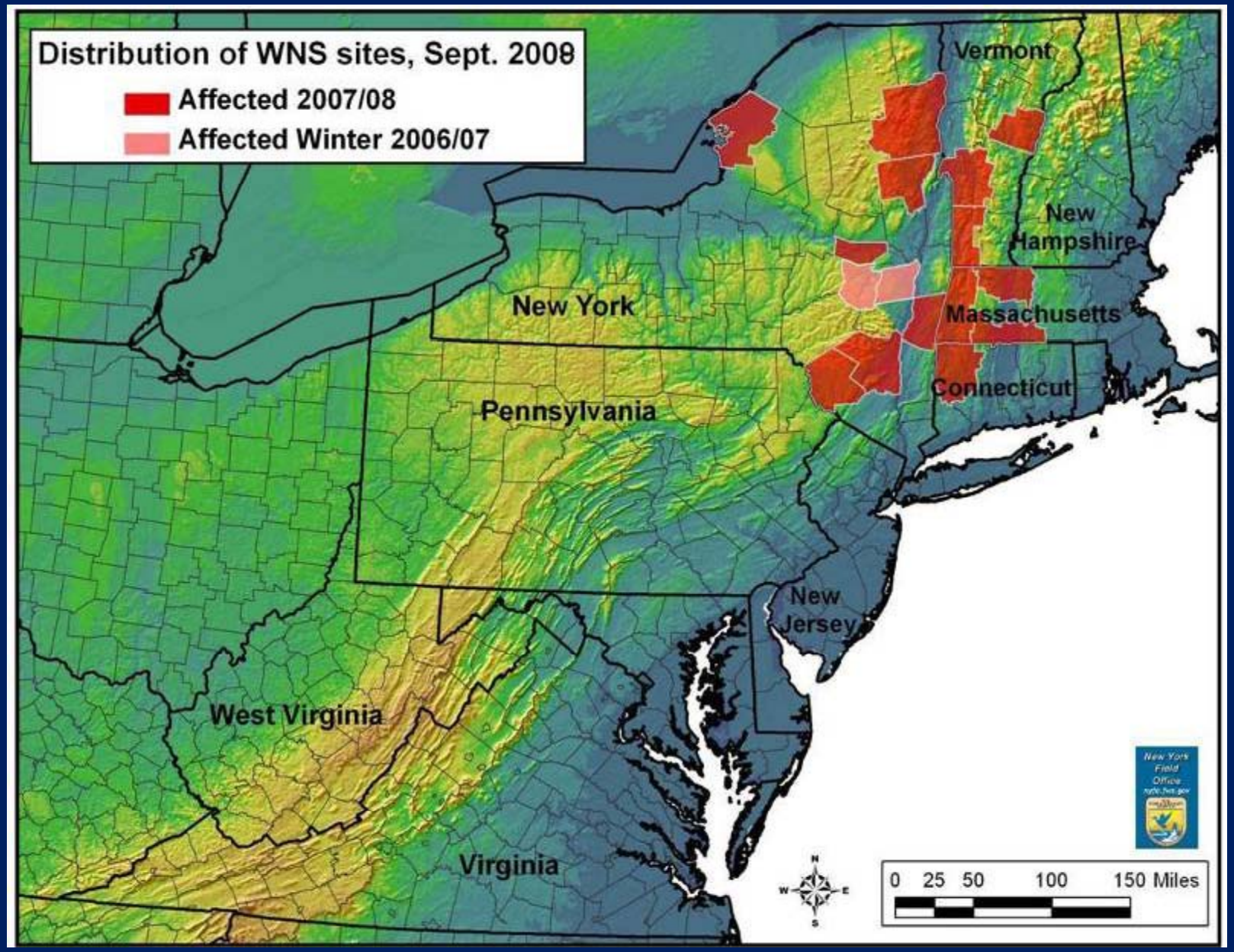
Small-footed bat
Myotis lebeii

Northern long-eared bat
Myotis septentrionalis

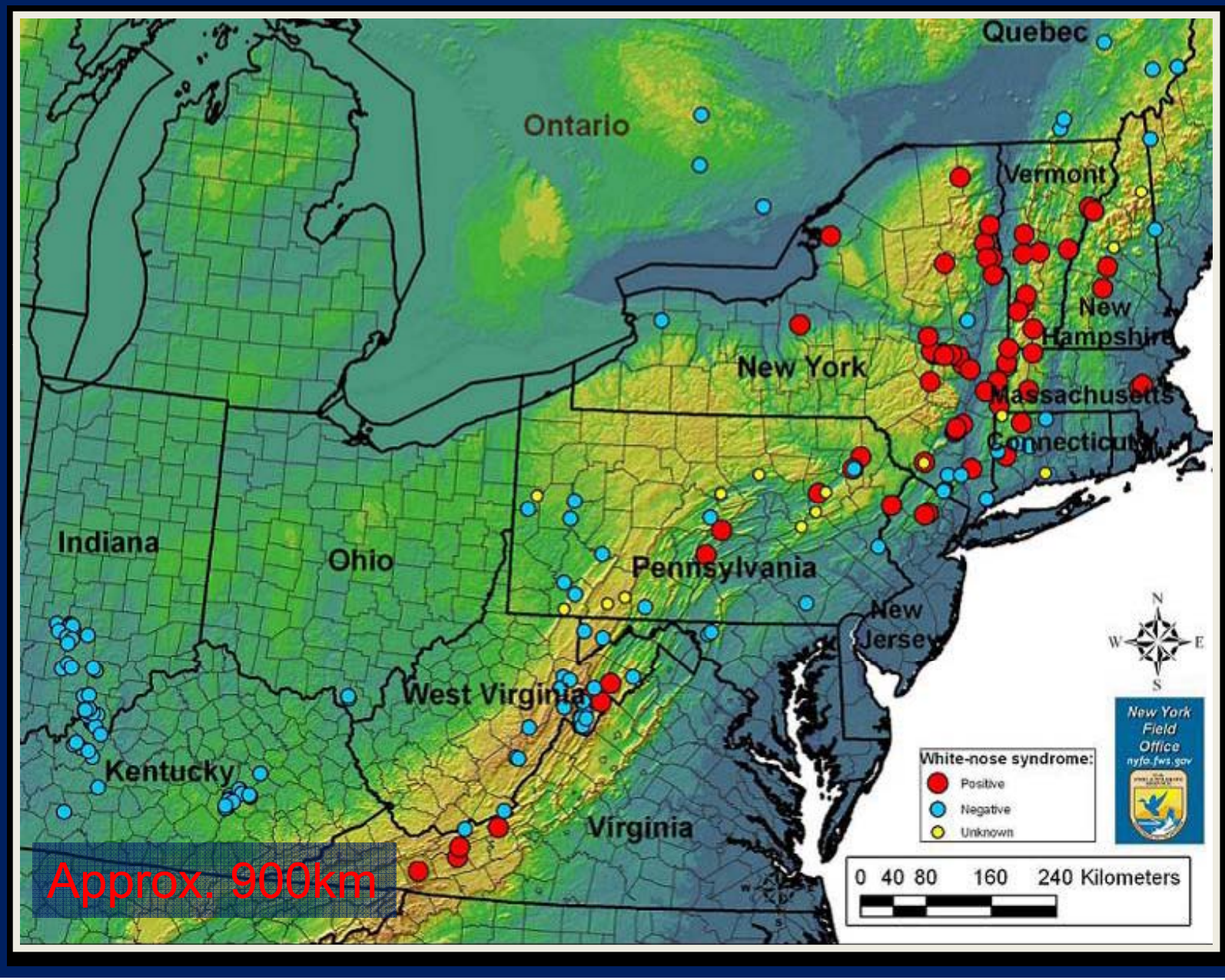
2007 - 1 state, 5 sites



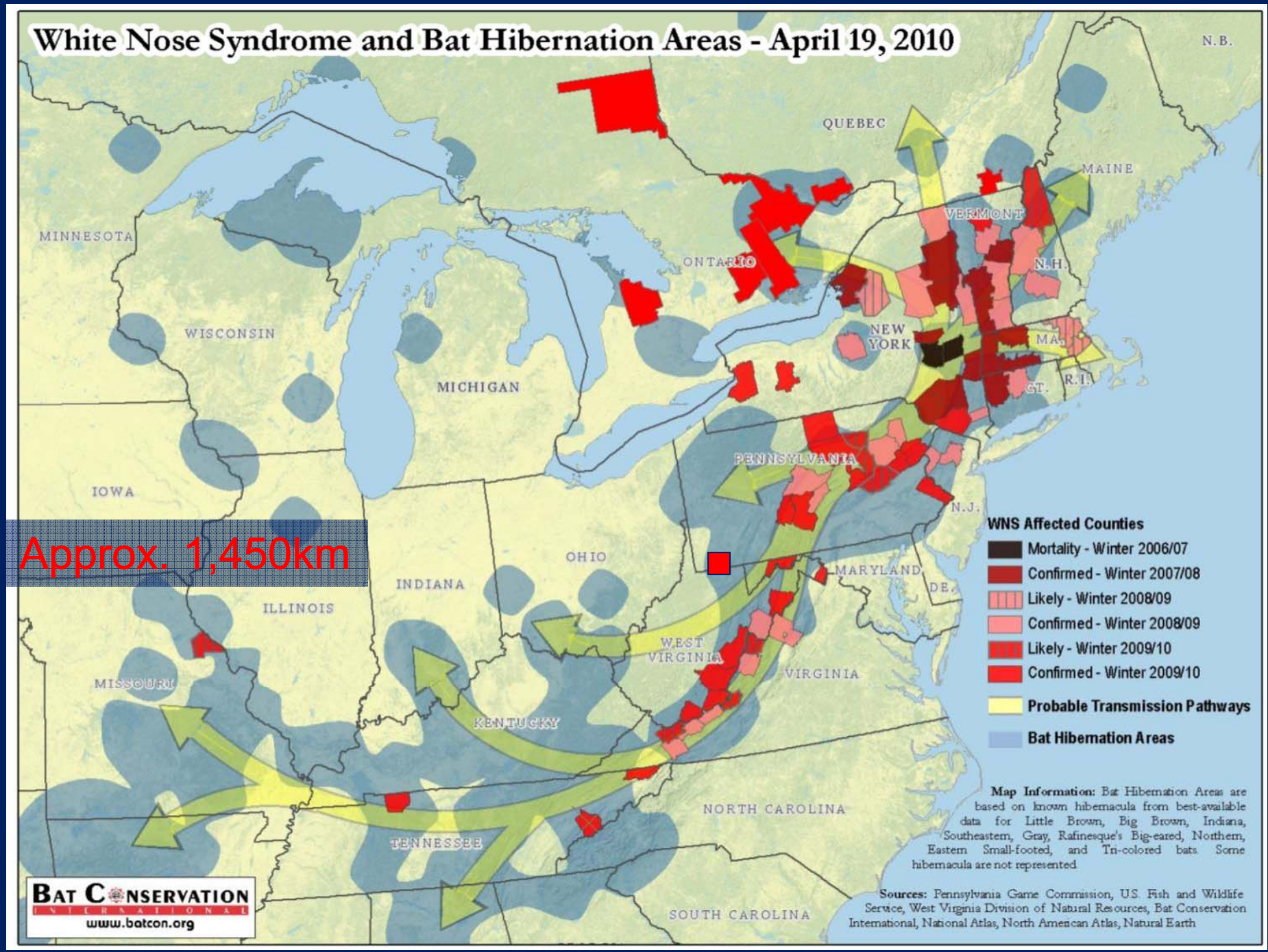
2008 - 4 states, 38 known sites

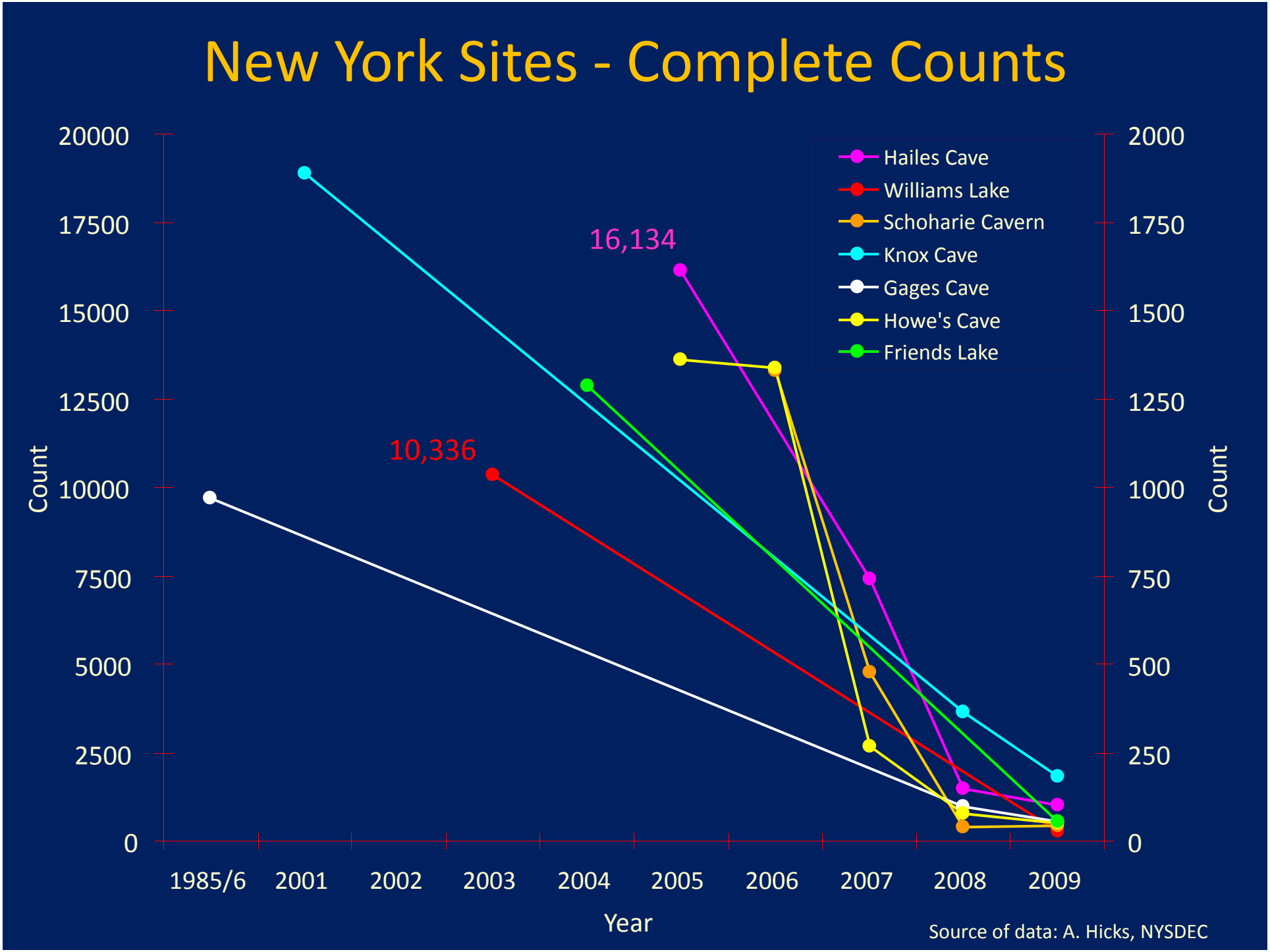


2009 – 9 states, 81 known sites

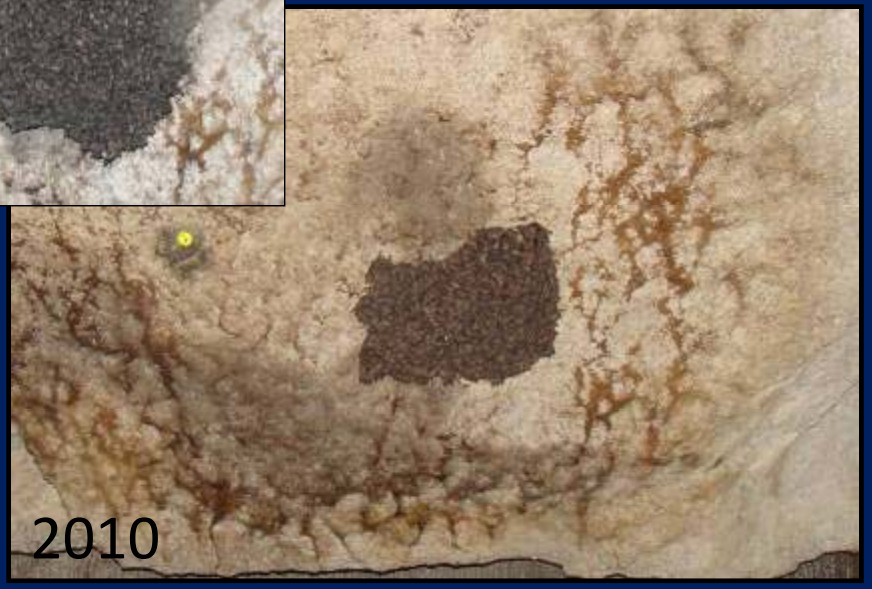


April 2010: 12 States, 2 Provinces, >115 known sites


White Nose Syndrome and Bat Hibernation Areas - April 19, 2010
Approx. 1,450km
N.B.
QUEBEC
MAINE
VERMONT
N.H.
MINNESOTA
ONTARIO
WISCONSIN
NEW YORK
MA.
R.I.
CT.
MICHIGAN
PENNSYLVANIA
IOWA
N.J.
OHIO
MARYLAND
DE.
INDIANA
ILLINOIS
WEST VIRGINIA
VIRGINIA
MISSOURI
KENTUCKY
NORTH CAROLINA
TENNESSEE
SOUTH CAROLINA
WNS Affected Counties
Mortality - Winter 2006/07
Confirmed - Winter 2007/08
Likely - Winter 2008/09
Confirmed - Winter 2008/09
Likely - Winter 2009/10
Confirmed - Winter 2009/10
Probable Transmission Pathways
Bat Hibernation Areas
Map Information: Bat Hibernation Areas are based on known hibernacula from best-available data for Little Brown, Big Brown, Indiana, Southeastern, Gray, Rafinesque's Big-eared, Northern, Eastern Small-footed, and Tri-colored bats. Some hibernacula are not represented.
Sources: Pennsylvania Game Commission, U.S. Fish and Wildlife Service, West Virginia Division of Natural Resources, Bat Conservation International, National Atlas, North American Atlas, Natural Earth
BAT CONSERVATION INTERNATIONAL
www.batcon.org


New York Sites - Complete Counts
20000
17500
15000
12500
10000
7500
5000
2500
0
Count
2000
1750
1500
1250
1000
750
500
250
0
Count
16,134
10,336
Hailes Cave
Williams Lake
Schoharie Cavern
Knox Cave
Gages Cave
Howe's Cave
Friends Lake
1985/6
2001
2002
2003
2004
2005
2006
2007
2008
2009
Year
Source of data: A. Hicks, NYSDEC

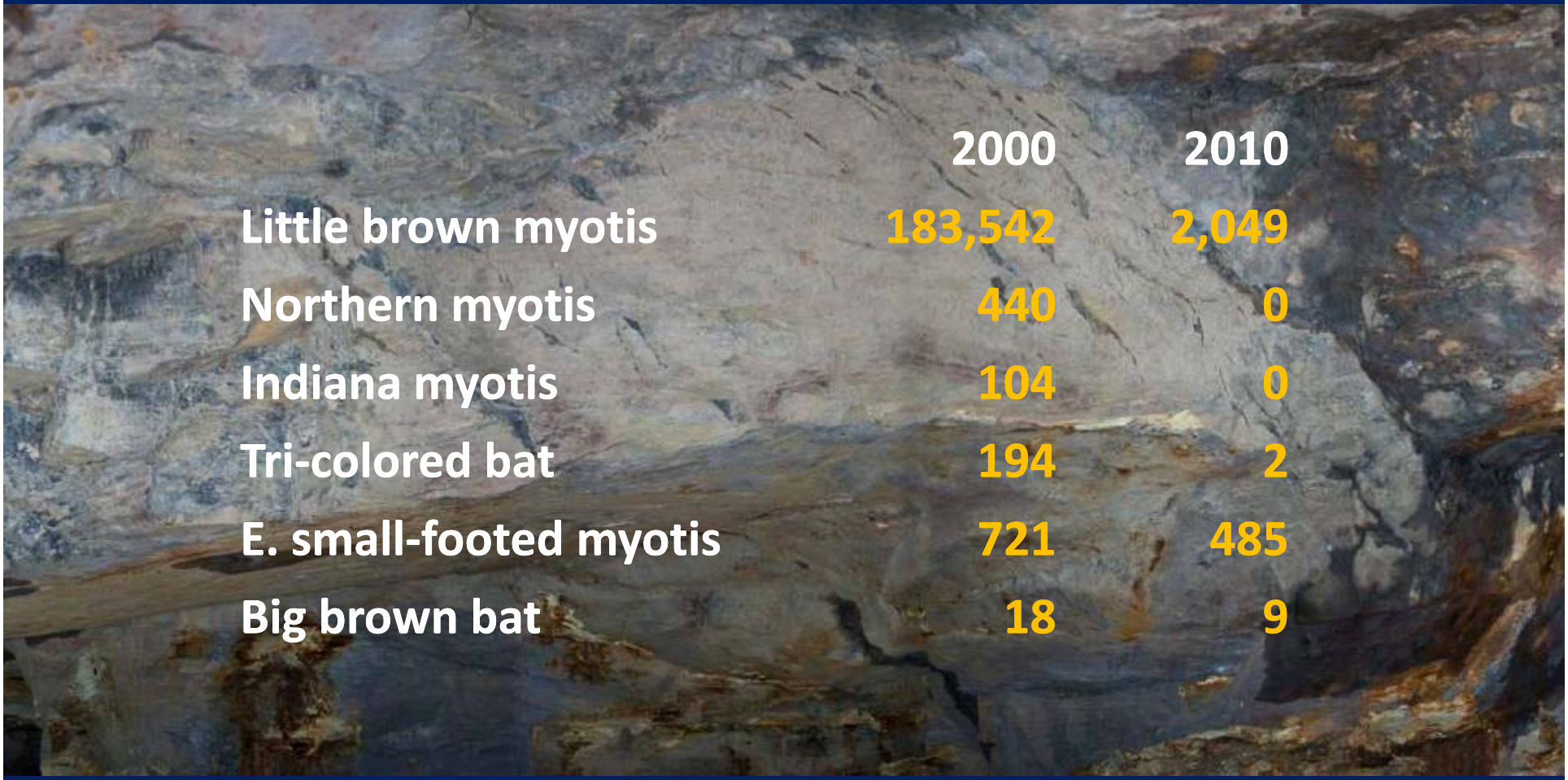
Glen Park, NY



Photos Courtesy of Ray Rainbolt, Fort Drum

Graphite Mine, NY – March 2008

Graphite Mine, NY – April 2009



	2000	2010
Little brown myotis	183,542	2,049
Northern myotis	440	0
Indiana myotis	104	0
Tri-colored bat	194	2
E. small-footed myotis	721	485
Big brown bat	18	9

Photo and data: Al Hicks, NYSDEC

What We Know About WNS

- Over 90% mortality at many affected sites
- Spreading rapidly, behaves like a pathogen
- All 6 northeastern cave bat species affected
- Est. >1 million bats have died
- No evidence of bacterial, viral, or parasitic cause
- Susceptibility may differ by bat species or with microclimate
- Bats can become infected from an affected environment
- Recovery to pre-WNS population levels will take many years, if even possible

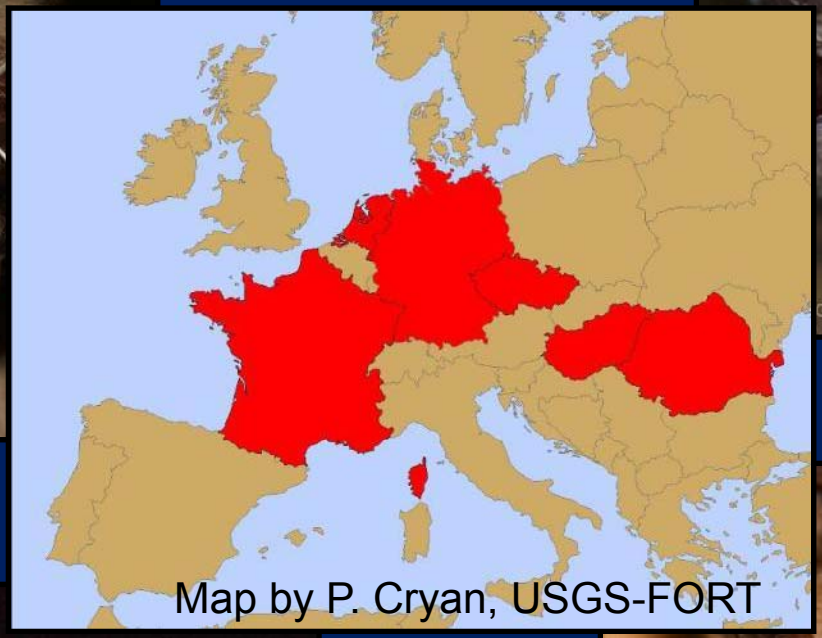
What We Know About WNS Fungus:

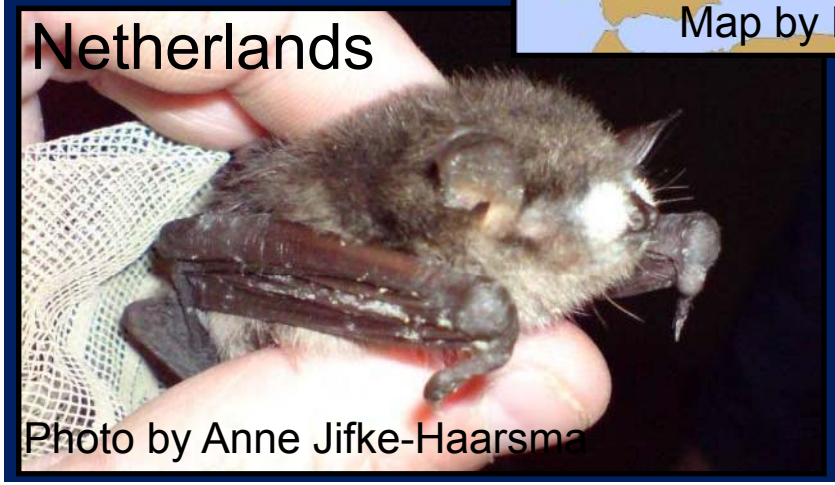
Geomyces destructans

Photo by D. Berndt, NWHC

- A newly described fungal species
- Optimal growth at 5-14° C
- Invades skin tissue of hibernating bats
- Genetically similar fungal isolates found at multiple affected hibernacula in the U.S. (also sediment)
- Bat-to-bat transmission has been demonstrated – NWHC
- Conidia have been found sticking to cave gear
- A morphologically identical fungus to *G. destructans* has been found on European bats

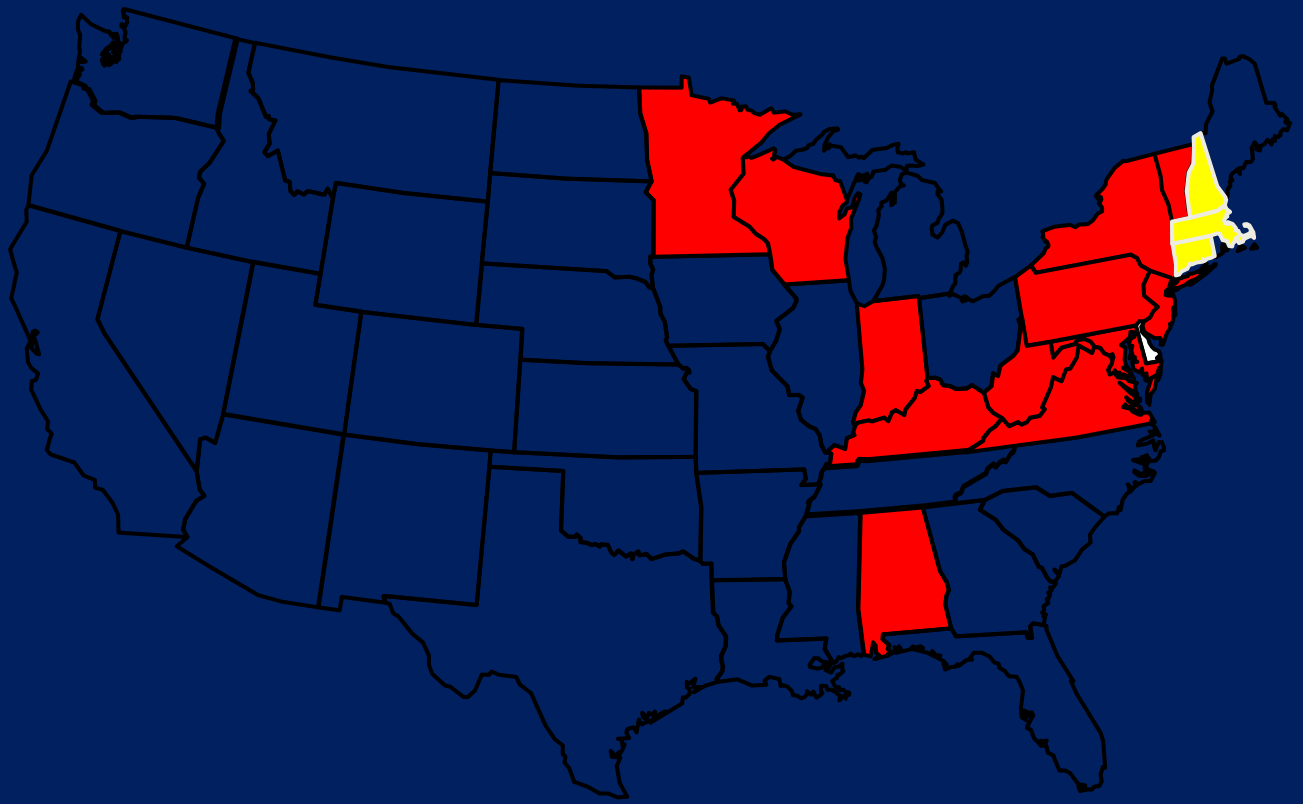
WNS: A European Connection?





Cave Sediment Sampling Project

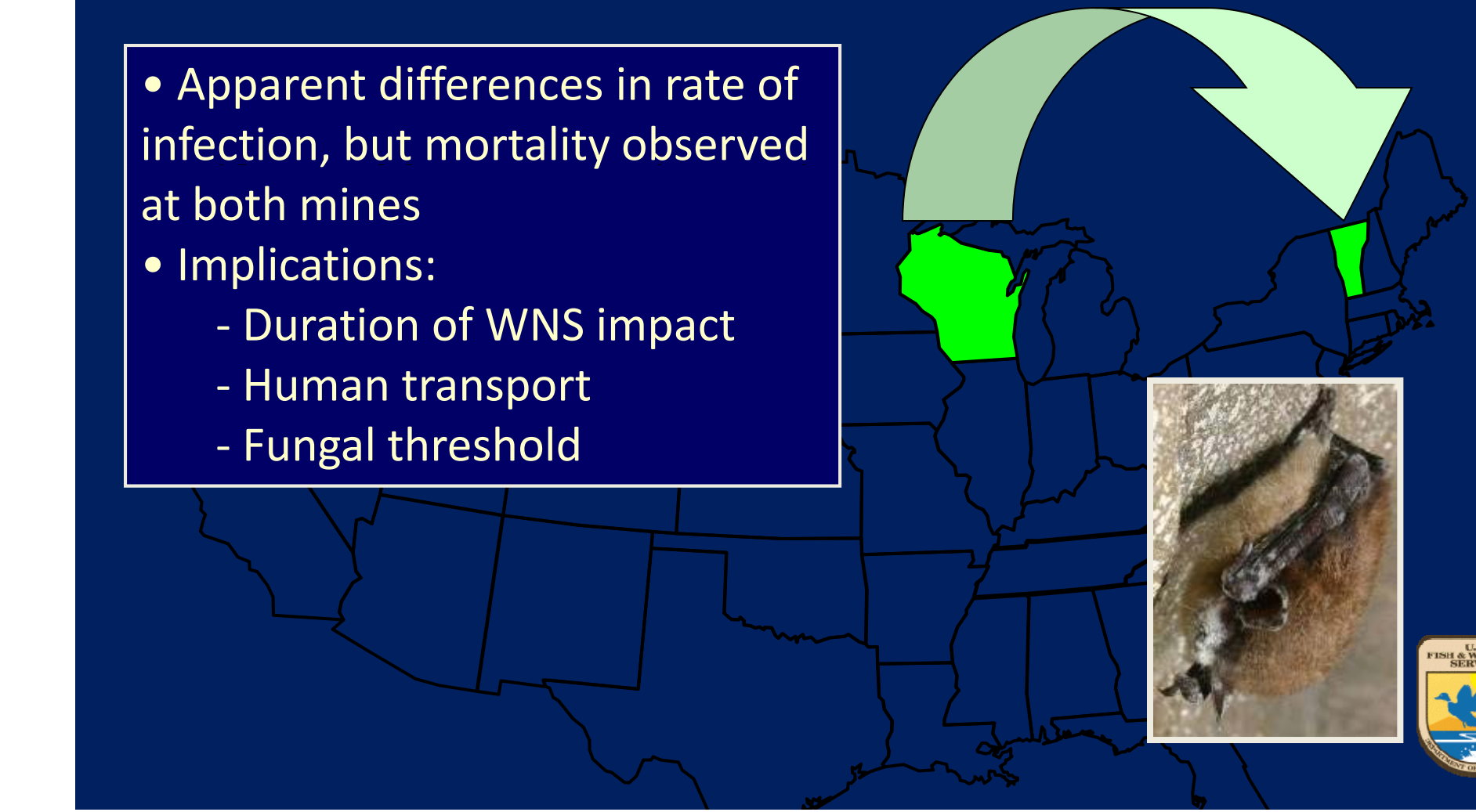
- Collected 550 sediment samples from 120 caves
- Screen samples by PCR
- 19 samples from affected and 5 from unaffected analyzed
  - Found *G. destructans* in samples from 3 states



Bat Translocation Study 2009/2010

- 80 “naïve” MYLU transported to Vermont from Wisconsin
  - 2 WNS-affected mines, sealed

- Apparent differences in rate of infection, but mortality observed at both mines
- Implications:
  - Duration of WNS impact
  - Human transport
  - Fungal threshold



Antifungal Treatments

- Some success in the lab
- Limited attempts at field application have not been successful

Video Surveillance

- To compare behaviors of hibernating bats before and after arrival of WNS
- Pilot in 2009/10
- 4 systems in 2010/11

Screen shot from Batspy camera system

Managing WNS: Response by Region

- Region 5 (states & FWS) - Immediate response
  - Focus on Containment

- USFWS Region 3, and some states, are working on Response Plans to prepare for arrival of WNS (Tennessee, Kentucky, North Carolina, Indiana, Wisconsin, Missouri, Georgia, Alabama, Oklahoma, ….)
  - Monitoring and surveillance
  - Outreach and communications
  - Research/lab coordination

Some Key Actions to Date

- WNS investigation team: inter- & extra-agency
  - Coordination structure
  - Working Groups established
- FWS webpage – the nexus for WNS info

  http://www.fws.gov/northeast/white_nose.html
- Containment:
  - Decontamination protocols for caving and research
  - Cave Advisory – March 2009
- Structured Decision Making Initiative
- National Plan

WNS National Plan

Purpose:

To guide the response of federal, state, and tribal agencies to WNS

Multi-agency and tribal input: FWS, USGS, NPS, AFWA, USFS, DOD, APHIS, St. Regis Mohawks

The plan will establish an organizational structure with oversight up to Washington level

- Formally establishes working groups:
  1. Communications
  2. Scientific and Technical Information Dissemination
  3. Diagnostics
  4. Disease Management
  5. Research Coordination
  6. Disease Surveillance
  7. Conservation and Recovery

Recent Funding Announcements

2010 Interior and Environment Appropriations Bill Conference Agreement :

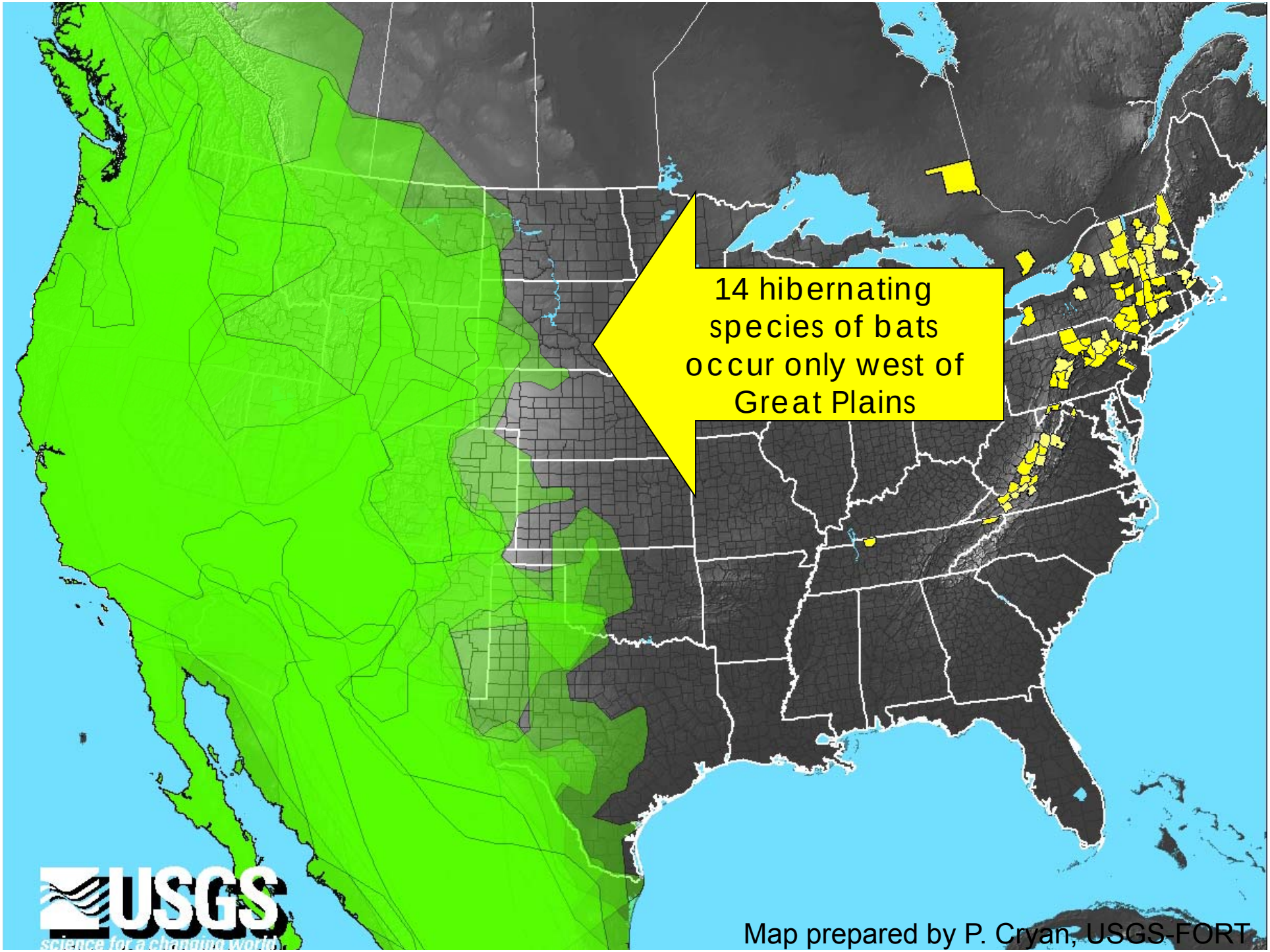
- $1,900,000 “for research, monitoring, and related activities to respond to the massive mortality in bats”

USFWS, 2010 Preventing Extinction Grant:

- $1,400,000 "for the implementation of urgently needed actions for critically endangered species”

General Research Priorities

- The cause of bat mortality
- Transmission and persistence
- Susceptibility
- Treatment/containment options
- Diagnostic tools
- Origin of WNS, European connection
- Population monitoring and modeling
- Bat genetics: conservation and disease


14 hibernating species of bats occur only west of Great Plains
USGS
science for a changing world
Map prepared by P. Cryan, USGS-FORT

Partners in the Investigation

Federal Agencies/Sponsored

- DOI: USFWS, USGS, NPS
- USDA: USFS, APHIS
- DOD: ACOE, ARMY
- Smithsonian Institution, National Zoo
- National Institute for Mathematical and Biological Synthesis
- SE Cooperative Wildlife Disease Study

Academia

- Boston Univ.
- Bucknell Univ.
- Columbia Univ.
- Cornell Univ.
- Eastern Michigan Univ.
- Fordham Univ.
- Indiana State Univ.
- Missouri State Univ.
- Northern Kentucky Univ.
- Tufts University
- UC Davis
- University Hospitals Case Medical Center
- U. of Guelph
- U. of Tennessee
- U. of Winnipeg

State Agencies

- AK, AL, AR, AZ, CA, CT, DE, FL, GA, IA, ID, IL, IN, KY, LA, MA, MD, ME, MI, MN, MO, MS, MT, NC, ND, NE, NH, NJ, NM, NV, NY, OH, OK, OR, PA, RI, SC, SD, TN, TX, UT, VA, VT, WA, WI, WV, WY

Non-Government Organizations

- Bat Conservation International
- National Speleological Society
- The Nature Conservancy
- Defenders of Wildlife
- Disney
- Bat World
- Am. Museum of Natural History
- Association of Zoos & Aquariums

International

- Canada (AL, BC, QC, ON, NB)
- Canadian Coop. Wildlife Health Center
- European biologists
- IUCN

Tribal Agencies

- St. Regis Mohawk
- Wampanoag

In Closing

- Significant mortality and spreading
- Unknown ecological impacts
- Control presents biological and social challenges
- Multiple novel threats to bats
- 3 Federally-listed species vulnerable now
- Potential to impact 25 of 45 N. Am. bat species
- Science-based management recommendations